CLAIMS:

What is claimed is:

1. A method of producing a pre-alloyed stabilized zirconia powder comprising the steps of:

alloying zirconia with a stabilizer selected from the group of yttria, ceria, magnesia, ytterbia, scantia, dysprosia, neodymia, and calcia, the stabilizer being present in a quantity of between about 5% and 25% relative to the zirconia by weght;

powderizing the alloyed stabilized zirconia;

spray-drying the stabilized zirconia powder to produce an agglomerated powder having an average particle size suitable for use in spray coating applications.

2. The method of claim 1, wherein the stabilizer is yttria.

3. The method of claim 2, wherein the yttria is present in a quantity of between about 6% and 10% relative to the zirconia.

4. The method of claim 3, wherein the yttria is present in a quantity of about 8% relative to the zirconia.

5. The method of claim 1, wherein at least a substantial portion of the stabilized zirconia powder comprises particles having a size of no more than about an order of magnitude smaller than an average particle size of the agglomerated powder.

6. The method of claim 1, wherein the stabilized zirconia powder has an average particle size of no more than about 10 microns.

7. The method of claim 6, wherein the agglomerated powder has an average particle size in the range of between about 11 and 150 microns.

8. A pre-alloyed stabilized zirconia powder comprising generally spherical particles with an average size of between about 11 and 150 microns, each particle comprising a plurality of sub-particles held together by a binder, at least a portion of the sub-particles being alloyed with a stabilizer selected from the group of yttria, ceria, magnesia, ytterbia, scantia, dysposia neodymia, and calcia, the stabilizer being present in a quantity of between about 5% and 25% relative to the zirconia by weight.

9. The powder of claim 8, wherein the stabilizer is yttria.

10. The powder of claim 9, wherein the yttria is present in a quantity of between about 6% and 10% relative to the zirconia.

11. The powder of claim 10, wherein the yttria is present in a quantity of about 8% relative to the zirconia.

12. The powder of claim 8, wherein at least a substantial portion of the sub-particles have a size of no more than about an order of magnitude smaller than an average particle size of the agglomerated powder.

13. The powder of claim 8, wherein at least a substantial portion of the sub-particles are no more than about 10 microns in size.

14. A method of producing a thermal barrier coating on a substrate comprising the steps of:

providing a pre-alloyed stabilized zirconia powder comprising generally spherical particles with an average size of between about 11 and 150 microns, each particle comprising a plurality of sub-particles held together by a binder, at least a portion of the sub-particles being alloyed with a stabilizer selected from the group of yttria, ceria, magnesia, ytterbia, scantia, dysposia neodymia, and calcia, the stabilizer being present in a quantity of between about 5% and 25% relative to the zirconia by weight; and

applying the powder to the substrate using a thermal spray process.

15. A thermal barrier coating produced according to the method of claim 14.

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16. The method of claim 14, wherein the stabilizer is yttria.

17. The method of claim 16, wherein the yttria is present in a quantity of between about 6% and 10% relative to the zirconia.

18. The method of claim 17, wherein the yttria is present in a quantity of about 8% relative to the zirconia.

19. The method of claim 14, wherein at least a substantial portion of the sub-particles have a size of no more than about an order of magnitude smaller than an average particle size of the agglomerated powder.

20. The method of claim 14, wherein at least a substantial portion of the sub-particles are no more than about 10 microns in size.

21. A thermal barrier coating comprising:

zirconia alloyed with a stabilizer selected from the group of yttria, ceria, magnesia, ytterbia, scantia, dysprosia, neodymia, and calcia, the stabilizer being present in a quantity of between about 5% and 25% relative to the zirconia by weight;

the thermal barrier coating having a porosity of about 11% and a thermal conductivity less than or equal to about 0.49 W/m-K at temperatures of at least 25°C.

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~~304.47~~
315.5

22. The thermal barrier coating of claim 21, wherein the stabilizer is yttria.

23. The thermal barrier coating of claim 22, wherein the yttria is present in a quantity of between about 6% and 10% relative to the zirconia.

24. The thermal barrier coating of claim 23, wherein the yttria is present in a quantity of about 8% relative to the zirconia.

25. A thermal barrier coating comprising:

zirconia alloyed with yttria, the yttria being present in a quantity of about 8% relative to the zirconia by weight;

the thermal barrier coating having a porosity of about 11% and a thermal conductivity less than or equal to about 0.47 W/m-K at temperatures of at least 25°C.

26. The thermal barrier coating of claim 25, having a thermal conductivity of less than or equal to about 0.43 W/m-K at temperatures between 500 and 1000 °C.

27. The thermal barrier coating of claim 25, having a thermal conductivity of between about 0.47 W/m-K to about 0.375 W/m-K in a temperature range between 25 and 1000 °C.